

# PATENT SPECIFICATION

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## (54) BEATER MILL

(71) We, GEBRUEDER BUEHLER AG, a Swiss Body Corporate, of CH 9240, Uzwil, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a beater mill. Such mills have a rotor which carries beaters and which is mounted in a housing. Product which has been ground leaves the housing by way of a screen which surrounds the rotor along at least part of its periphery.

Replacement of the screen tends to be cumbersome and time-consuming and it is with this that the invention is concerned.

According to the invention we provide a beater mill having a rotor that carries beaters, the rotor being mounted for rotation within a housing, the housing having at least one side door, a screen which extends around the rotor at least in the region of the door and the screen being mounted on the door so as to move with the door.

Preferably the door is mounted for outwardly pivoting movement about an axis parallel to the rotor axis; and in a preferred form of beater mill the pivot axis of the door is in the lower part of the beater mill.

In a simple construction, the door carries a screen frame for receiving the screen, and the door is formed with a box-like recess which together with the screen forms a discharge chamber. Desirably the screen frame is disposed partly within the recess of the door. The screen is thus held laterally. Further, the screen frame may include a member extending parallel to the rotor axis, that member serving to hold the screen and constituting a boundary of the region around the rotor to which the screen extends.

Since the screen suffers impacts from foreign bodies in the product, it could become deformed. This can be prevented by securing on the housing cross-beams having flanges on their inward facing sides to provide for radial support of the screen.

A great advantage of the features mentioned above is that it makes possible constructions in which the screen can be simply laid on the screen frame and into the door without having to be secured as e.g. by a large number of screws. This considerably shortens the time required for changing the screen, whereas the production of the screen itself amounts only to cutting it to size and shaping it, without any need to provide it with fixing holes or reinforcements. The screen can conveniently be held in the radial direction by providing supports for it on the housing. The supports are preferably rings or ring segments matching the screen frame. In the result, the screen is clamped between the screen frame and the supports when the door is closed.

If the pivot axis of the door is arranged below the rotor and near the vertical plane passing through the axis of the rotor, it is possible with only two doors to surround almost the entire periphery of the rotor with two screens, thereby obtaining a large screen area and hence a high output for the given volume. When the door is opened, by choice of an appropriate construction, overlapping with the rotor region can be avoided, particularly if the pivot axis is situated below the lowest point of the door. If the door can be slid or hooked onto the pivot axis it can be removed entirely from the mill for placing a fresh screen on the screen frame, which facilitates handling. A simple construction is obtained if arms are secured on the lower portion of the screen frame, the arms projecting from the door for pivotable connection

to the pivot axis, and if the arms are provided with open sided recesses, such as bearings holes which are open at one side or open slots. Quick clamping and releasing of the door is possible by the use of T-screws for securing the upper portion of the door to the housing.

With the box-shaped construction of the door, the rotor can project out of the housing. The bolts on which the beaters are arranged can be taken out after loosening of a specially arranged securing means and the beaters replaced without having to remove the rotor from the housing.

The drawings show diagrammatically by way of example one form of beater mill embodying the invention, and in the drawings:

Fig. 1 shows a front view of the beater mill as seen in the direction of the arrow I in Fig. 3; the right-hand half is seen in section along the line Ib-Ib of Fig. 3 apart from the rotor;

Fig. 2 corresponds to Fig. 1 and shows the right hand door in the open position;

Fig. 3 is a section taken on the line III-III of Fig. 1, without the door;

Fig. 4 shows the door from the inside, in the same view as in Fig. 3;

Fig. 5 is a section drawn to a larger scale of a detail of the rotor in the lower left-hand region of Fig. 3; and

Fig. 6 shows a side view of the structure of Fig. 5.

In the housing 11 (Figs. 1 and 3) is mounted the rotor 12. The rotor 12 includes two discs 13, 14 which are secured to a shaft 15. They are connected securely by carriers 17. Inserted in the carriers 17 are bolts 18 to which beaters 19 are pivotably connected.

The shaft 15 driven by a motor (not shown) is mounted in bearings 21 of the housing 11. This has a front wall 23 and a rear wall 24 connected to one another by various transverse members, namely upper wall portions 26 at the inlet 27, upper cross-beams 28, a lower cross-beam 29 and wall portions 30 of the outlet hopper 31.

Two laterally outwardly pivotable doors 36, 35 of like construction are pivoted to the housing 11. The door 35 is box-shaped. A screen frame 39 is secured thereto. It is situated partly within the door 35. Below, it has a strip 40 extending parallel to the axis of the rotor 12. In the screen frame 39 and partly in the door 35 is inserted a screen 43, preferably a perforated plate, which surrounds the rotor 12 along almost half its periphery. The strip 40 is used for holding the screen 43 and it defines the portion of the periphery of the rotor 12 where the screen 43 is mounted. The cross-beams 28, 29 are provided at their internal side with flanges 45 under which the screen

43 is held. Rings 46 are provided on the housing 11, on the walls 23, 24, which serve as supports co-operating with the screen frame 39 for clamping the screen 43. A discharge chamber 48 is situated between the screen 43 and door 35.

On the lower portion 51 of the screen frame 39 projecting from the door 35 are secured arms 53 provided with bearing bores 54 that are open at one side. The pivot axis of the door 35 is situated near to the vertical plane through the axis of the rotor 12, and below the rotor 12 and the lowest point of the door 35. It is formed by two pins 57, 58 secured in alignment on the walls 23, 24 of the housing 11. By means of the arms 53 and the laterally open bearing bores 54 the door 35 can be fitted or hooked onto the pins 57, 58 constituting the pivot axis. T-screws 60 which can be swung in the horizontal plane are provided to secure the upper portion of the doors 35, 36 to the housing 11.

Fig. 5, wherein the rotor 12 is depicted omitting the carriers 17, shows the pin 18 in the discs 13, 14. A plate 71 which acts as an axial stop for the pin 18 is welded to the disc 14. Welded to the disc 13 is a screw bolt 72 carrying a nut 74 with nylon fastener and a spacer sleeve 75. About the spacer sleeve 75 is a pivotable lug 77 which is pressed by the tightening nut 74 between two spring discs 79, 80, that provide a clamping bias. In the illustrated position the lug 77 is used as an axial stop for the pin 18. It is arranged with the screw bolt 72 within a ring 82 provided on the disc 13.

It should be noted that once the nut 74 is tightened it is usually not released again, and the clamping bias on the spring discs 78, 80 remains in being. The lug 77 is moved from one position into the other by the application of force, for example by pushing with a screwdriver.

Operation of the beater mill is as follows: Product to be ground enters the mill at the inlet 27, is engaged by the beaters 19 and rotates, mainly in the space between the rotor 12 and the screen 43, until it passes through the screen 43 and is discharged by way of the discharge chambers 48 and outlet hopper 31.

When a different product is to be ground in the mill it is often desirable to change the screen 43. First the drive is stopped and when the rotor 12 has ceased rotating, the T-screws 60 are released. Each door 35 or 36 is swung out laterally until it reaches the outermost pivoted position (Fig. 2). Owing to the low central position of the pivoting axis, there is no overlap between the door 35 and the region of the rotor 12.

The old screen 43 is removed and a new

screen 43 placed in the screen frame 39. The door 35 is then swung inwards against the housing 11. Thus the new screen 43 is clamped in position between the screen 5 frame 39 and the rings 46. The door 35 is again securely positioned with the T-screws 60.

If the beaters 19 have to be replaced it is desirable to take off the door 10 altogether. The door is then tilted further about its temporary position against the floor and the open bores 54 are released from the pins 58. The door 35 can be removed. The lug 77 is forced from the 15 blocking position shown in Figs. 5 and 6 into a position in which it releases the pin 18. After the old beaters 19 have been removed and new beaters 19 are fitted, the lug 77 is forced back into the blocking 20 position. The ring 82 prevents foreign bodies which may be in the beater mill from accidentally releasing the stop.

The arm 53 are again hooked on to the pins 57, 58 with the open bores 54 and the 25 door 35 is closed.

Some of the many possible constructional variants may be mentioned.

The flanges 45 of the cross-beams 28, 29 can be constructed as replaceable wearing 30 elements. The cross-beams 28, 29 can be screwed to the housing 11 instead of being welded thereto. The same applies to the way in which the screen frame 39 is secured on the doors 35, 36.

35 Instead of complete rings 46 it is often sufficient to use ring segments. The open bores 54 could be formed as open slots.

#### WHAT WE CLAIM IS:—

1. Beater mill having a rotor that carries 40 beaters, the rotor being mounted for rotation within a housing, the housing having at least one side door, a screen which extends around the rotor at least in the region of the door and the screen being 45 mounted on the door so as to move with the door.

2. Beater mill according to claim 1 wherein the door is mounted for outwardly pivoting movement about an axis parallel 50 to the rotor axis.

3. Beater mill according to claim 2 wherein the pivot axis of the door is in the lower part of the beater mill.

4. Beater mill according to any preceding 55 ing claim wherein the door carries a screen

frame for receiving the screen, and the door is formed with a box-like recess which together with the screen forms a discharge chamber.

5. Beater mill according to claim 4 60 wherein the screen frame is disposed partly within the recess of the door.

6. Beater mill according to claim 4 or claim 5 wherein the screen frame includes a member extending parallel to the rotor 65 axis, that member serving to hold the screen and constituting a boundary of the region around the rotor to which the screen extends.

7. Beater mill according to any of claims 4 to 6 wherein the housing is provided with cross beams having flanges to hold the screen in the radial direction.

8. Beater mill according to any of claims 4 to 7 wherein the housing is provided with supports for the screen. 75

9. Beater mill according to claim 8 wherein the supports are rings or ring segments.

10. Beater mill according to any preceding claim wherein the pivot axis of the door is below the rotor and near the vertical plane that contains the rotor axis.

11. Beater mill according to claim 10, wherein the pivot axis of the door is below 85 the lowest part of the door.

12. Beater mill according to any preceding claim wherein the door can readily be engaged with and disengaged from pivot means on which it pivots about its pivot 90 axis.

13. Beater mill according to any preceding claim in combination with claim 4 wherein the lower portion of the screen frame projects from the door and carries 95 arms for pivotable connection to pivot means on which it pivots about its pivot axis.

14. Beater mill according to claim 13 wherein the pivot arms have open sided 100 recesses for ready engagement with and disengagement from the pivot means.

15. Beater mill according to any preceding claim in combination with claim 2 wherein T-screws are provided for 105 securing the door to the housing in a region of the door remote from its pivot axis.

16. Beater mill according to any preceding claim wherein part of the rotor 110

- projects from the housing when the door is open, the beaters being carried on the rotor by pins, each pin being secured in the axial direction by releasable stop means.
- 5 17. Beater mill according to claim 16 wherein the stop means is a lug pivotally connected to the rotor near the pin and held in position under clamping bias, such that the stop means can be released and
- 10 re-applied by the application of force, the pivoting axis of the lug and the axis of the pin being parallel to the rotor axis.
18. Beater mill according to claim 17 wherein the lug is surrounded by a project- ing member so as to be within a recess. 15
19. Beater mill according to any preceding claim wherein the housing has two doors each fitted with a screen such that the screens surround the rotor along nearly the whole of its periphery. 20
20. Beater mill substantially as shown in and hereinbefore described with reference to the accompanying drawings.

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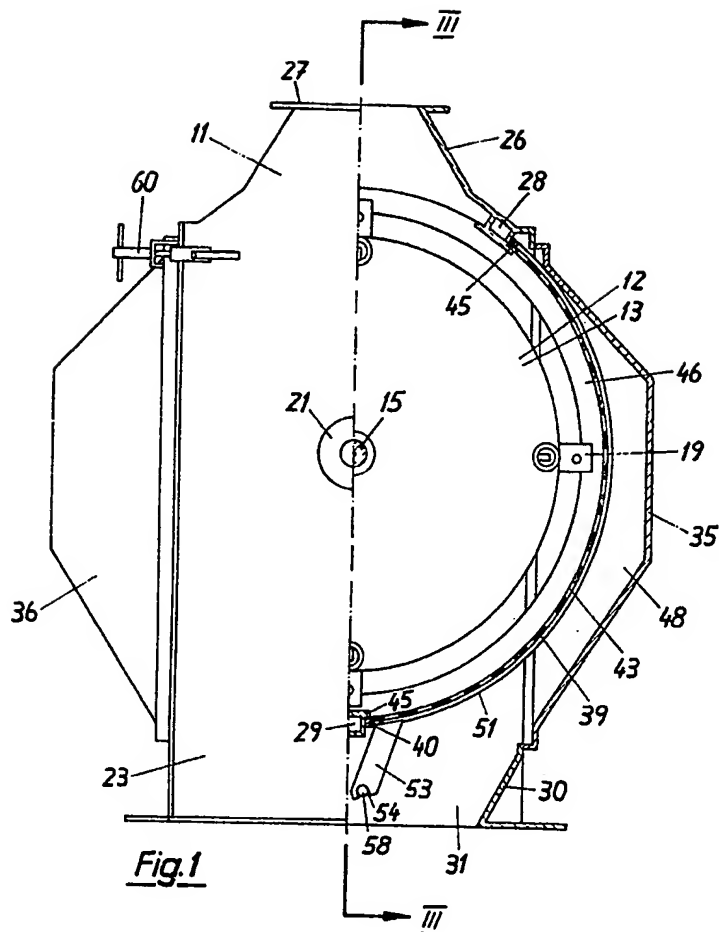
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COMPLETE SPECIFICATION

3 SHEETS

This drawing is a reproduction of  
the Original on a reduced scale  
Sheet 1



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